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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,912	07/30/2003	James Christopher Matayabas JR.	042390P16905	9608

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EXAMINER

DINH, TUAN T

ART UNIT	PAPER NUMBER
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2841

MAIL DATE	DELIVERY MODE
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09/10/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/631,912

Applicant(s)

MATAYABAS ET AL.

Examiner

Tuan T. Dinh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/20/07 has been entered.

Note of claimed language:

Jerabek et al. (U.S. Patent 5,565,701) shows in column 4, lines 39-40, Mikolajczak et al. (U.S. Patent 6,937,454) shows in column 8, lines 20-22, and Ramarge et al. (U.S. Patent 7,015,786) shows in column 7, lines 13-14 that all references cited disclose the polymer resin, which is a polyester.

the polyester matrix material can be a polycaprolactone, because the chain compound is one of the polymer resin family

See Google search note attached within the last Office action.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8, 9-13, and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. ('413 as in the record) in view of Tavares et al. (U.S. 2004/00777731 A1).

As to claim 1, Kang et al. discloses an electronic package as shown in figures 1-5 comprising:

- a first device (56) including a microelectronic die having an integrated circuit;
- a second device (52) including a first thermal plate; and
- a thermal interface material (54) between and in contact with surfaces of the first and second devices (56, 52), the thermal interface material including: at least one polyester matrix material (thermal polymer matrix); and at least one thermally conductive filler (filler paste) dispersed within the polyester matrix material.

Kang et al. does not specific disclose the matrix material being as a polycaprolactone.

Tavares et al. shows a thermal interface for a printed circuit board having a long chain polyols having a polycaprolactone material (see paragraphs 0031 and 0064).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching of Tavares et al. employed the matrix material of Kang et al. in order to improve heat resistance.

As to claim 2, Kang et al. discloses the thermal interface material is a phase change material.

As to claim 3, Kang et al. as modified by Tavares et al. discloses the matrix material having a melting point between 40°C and 130°C (because the thermal adhesive is a polymer resin, such as rubber, so the rubber having a melting point within a range of between 40°C and 130°C).

As to claim 4, Kang et al. discloses the matrix material has improved thermo-oxidative stability compared to a polyolefin resin.

As to claim 5, Kang discloses the polyester matrix material is polycaprolactone, which is one of the polymer resin family.

As to claims 6-8, Kang et al. discloses the thermal interface material further includes an additive to modify at least one of modulus, viscosity, and moisture adsorption, which is a resin, or at least one of polyolefin, polystyrene, polyacrylate, polyamide, polyimide, polyarylate, and epoxy.

As to claims 10-11, Kang et al. discloses the thermally conductive filler includes at least one of a ceramic, a metal, and a solder, and the thermally conductive filler includes at least one of zinc oxide, aluminum oxide, boron nitride, aluminum nitride, aluminum, copper, silver, indium, and tin.

As to claim 12, Kang et al. discloses the thermally conductive filler comprises between 10% and 90% of the thermal interface material by weight, see column 6, lines 34-43).

As to claim 13, Kang et al. discloses the thermally conductive filler further includes at least one of a surfactant, coupling agent, adhesion modifier, wetting agent, colorant, and stabilizer.

As to claim 18, Kang discloses the thermal interface material contacts the die on one side and the thermal plate on an opposing side.

As to claim 19, Kang et al. discloses the first device includes a second thermal plate thermally coupled to the die, the thermal interface material contacting the second thermal plate on one side and the first thermal plate on an opposing side.

As to claim 9, Kang et al. as modified by Tavares does not specific disclose the thermally conductive filler has a bulk thermal conductivity greater than 50 W/mK, but Kang does disclose the range in 5-15W/mk (column 5, lines 45-47).

The specific of the range of conductivity greater than 50W/mK would have been obvious based on the specific particular of the conductivity of the manufacture requirement. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a thermal conductivity greater than 50W/mK in order to achieve excellent heat dissipation.

3. Claims 14, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. ('413) in view of Tavares and further in view of Rose (U.S. patent 5,706,579).

As to claims 14, 16, Kang et al. as modified by Tavares et al. discloses all of the limitations of the claimed invention, except for the thermally conductive filler further includes a clay made of mica. Rose teaches the conductive filler including a clay made of mica.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a thermal conductivity filler having a mica clay as taught by Rose employed in the package of Kang et al. and Tavares et al. in order to achieve excellent heat dissipation.

4. Claims 15, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al in view of Tavares et al. and Rose, and further in view of Furuya et al. (U.S. Patent 7,022,407).

Regarding claims 15,17, Kang, Tavares, and Rose does not specific disclose individual platelet particles of the clay have a thickness of less than 2 nm and a diameter greater than 10 nm, and the clay is a swellable free-flowing powder having a cation exchange capacity from about 0.3 to about 3.0 milliequivalents per gram of mineral (meq/g).

Furuya et al. shows a clay having a thickness of less than 2 nm and a diameter greater than 10 nm, and the clay is a swellable free-flowing powder having a cation exchange capacity from about 0.3 to about 3.0 milliequivalents per gram of mineral (meq/g).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a teaching as taught by Furuya et al. employed in the package of Kang, Tavares and Rose in order to achieve excellent heat dissipation.

Response to Arguments

Applicant's arguments with respect to claims 1-4, and 6-19 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T. Dinh whose telephone number is 571-272-1929. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reichard Dean can be reached on 571-272-1984. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tuan Dinh

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September 01, 2007.

A handwritten signature in black ink, appearing to read 'Tuan T. Dinh', with a long, sweeping horizontal stroke extending to the right.

TUAN T. DINH
PRIMARY EXAMINER